

(No Model.)

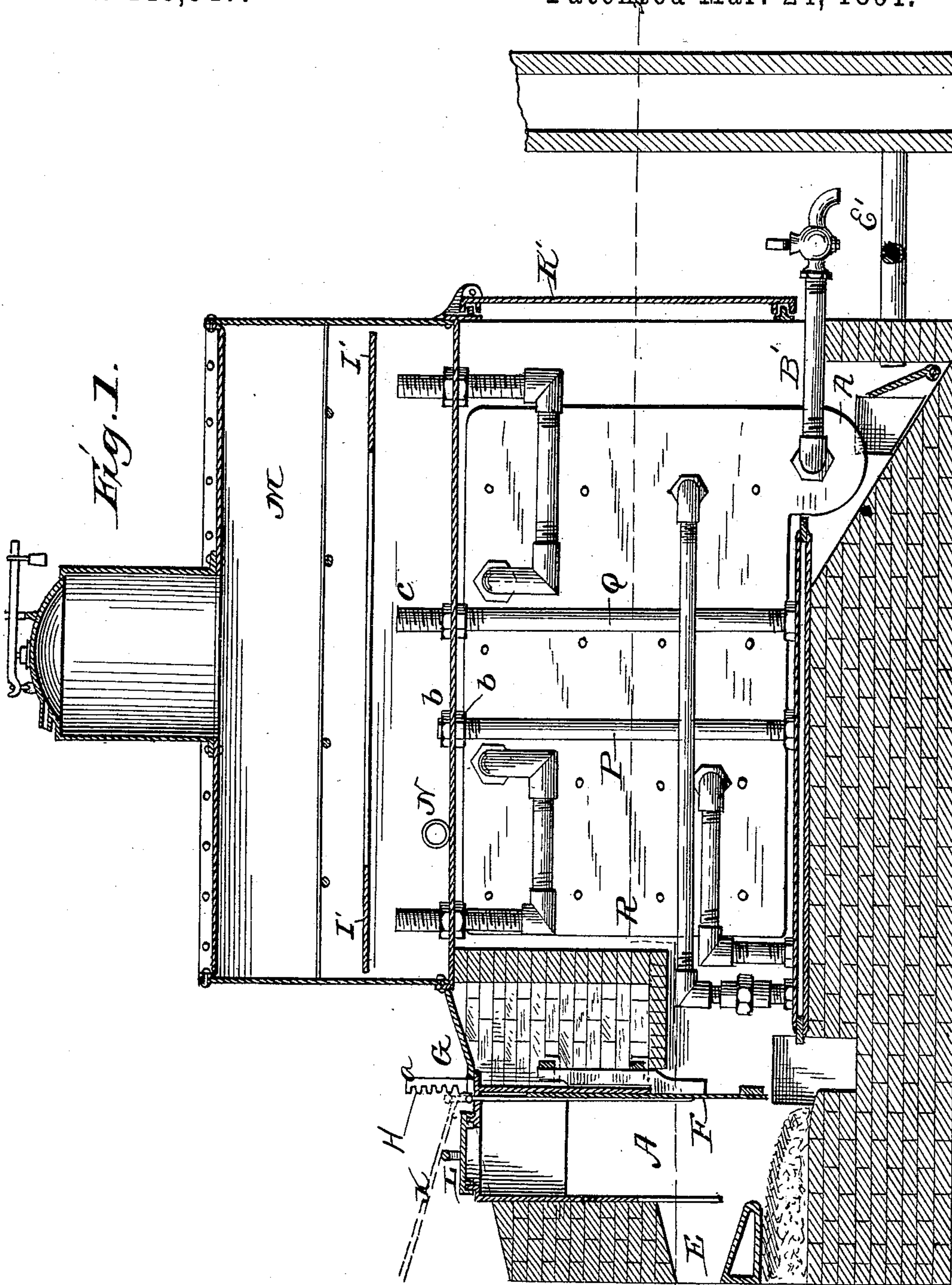
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E. FALES.

METHOD OF AND APPARATUS FOR GENERATING STEAM.

No. 448,947.

Patented Mar. 24, 1891.



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(No Model.)

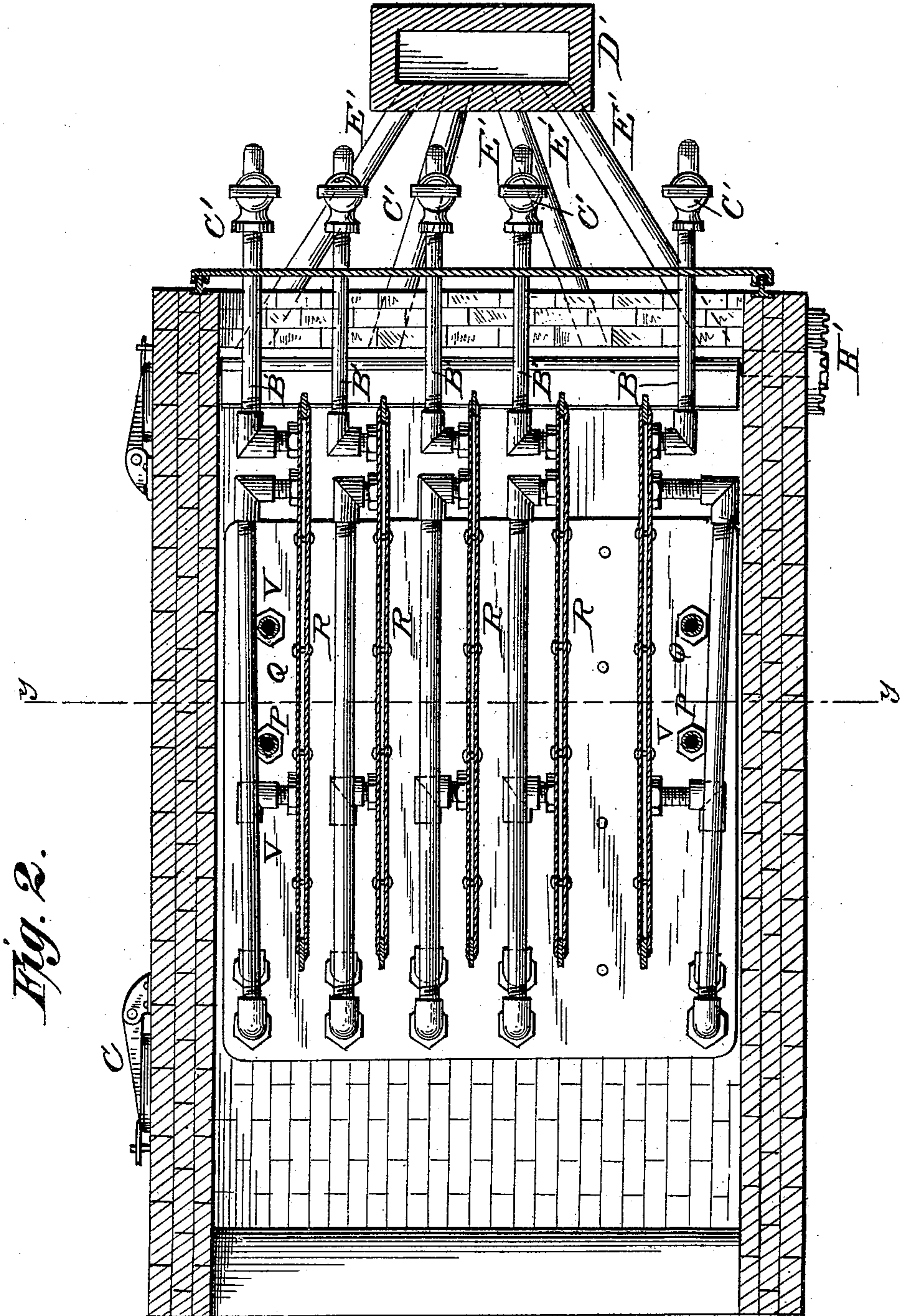
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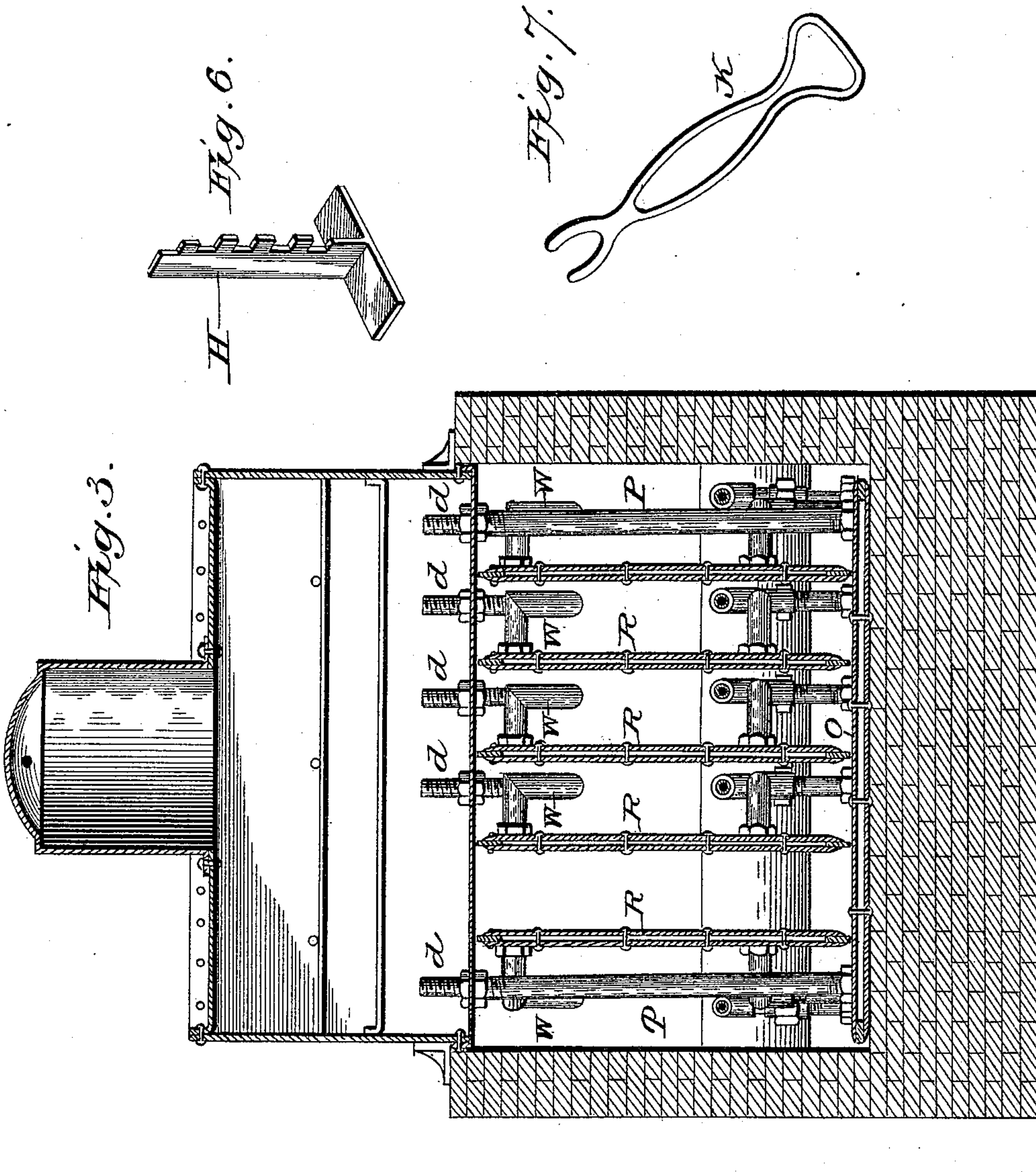
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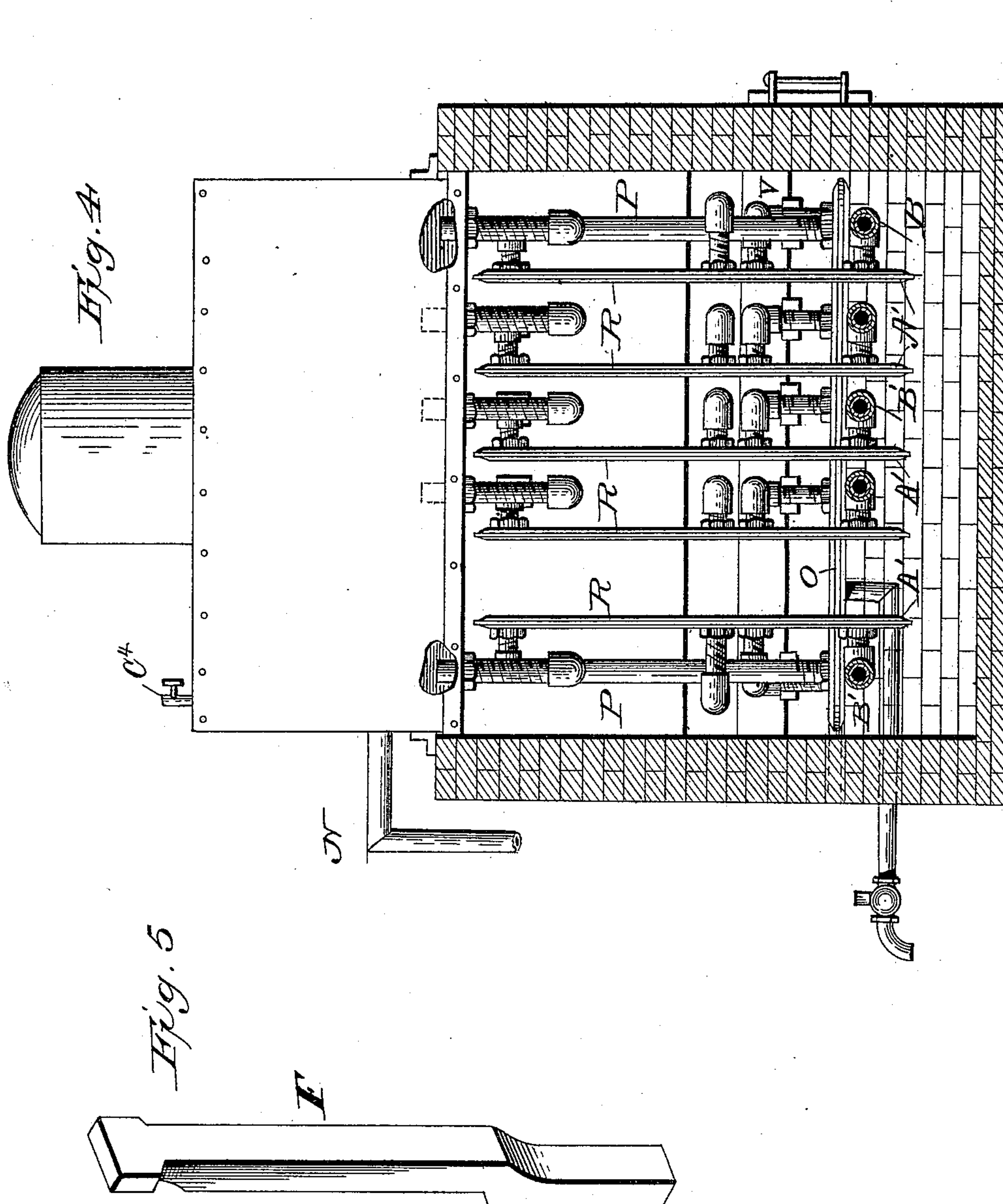
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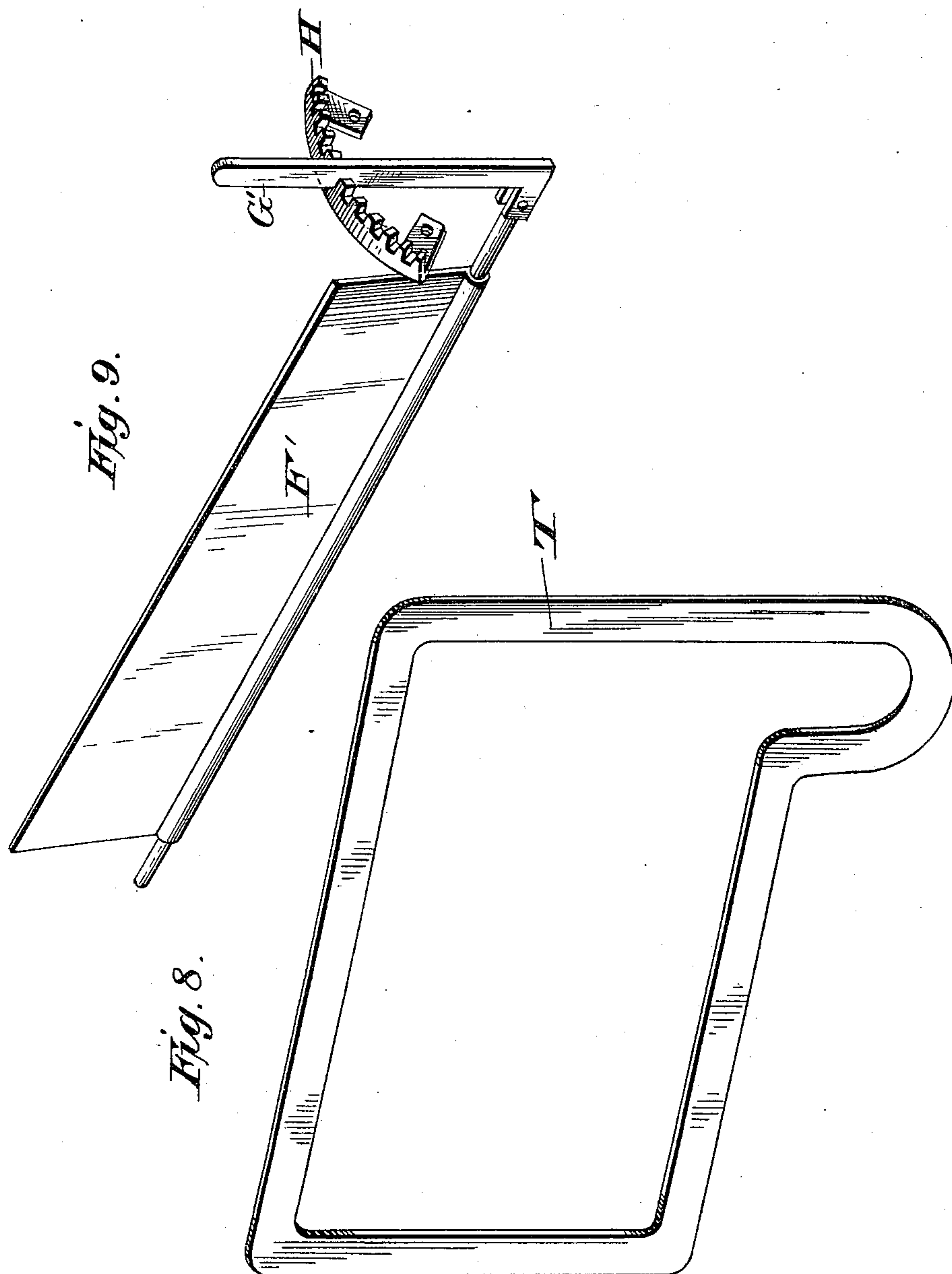
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UNITED STATES PATENT OFFICE.

EDWARD FALES, OF BOSTON, MASSACHUSETTS.

METHOD OF AND APPARATUS FOR GENERATING STEAM.

SPECIFICATION forming part of Letters Patent No. 448,947, dated March 24, 1891.

Application filed December 26, 1890. Serial No. 375,838. (No model.)

To all whom it may concern:

Be it known that I, EDWARD FALES, a citizen of the United States, and a resident of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in the Method of and Apparatus for the Generation of Steam; and I do hereby declare the following to be a full, clear, and exact description of said invention, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in the method of and apparatus for generating steam.

The object of my invention is to provide a device by which the water to be converted into steam will be fed down from an upper chamber into generators which are in the path of the products of combustion, said generators being connected with the water-chamber so that the water-chamber is connected with the lower portions of the generators and the upper portions of said generators with the water-supply or upper chamber.

In patents granted to me December 16, 1890, Nos. 442,966 and 442,967, I have shown, described, and claimed a chamber through which the products of combustion pass, inclosed by water-chambers on four sides thereof, in which is arranged a series of narrow chambers in the path of the flame as they emerge from the furnace, whereby the water is rapidly heated and circulated to the other water-chambers and to the place of usage.

Referring to the drawings, Figure 1 is a longitudinal sectional view of my improved boiler. Fig. 2 is a horizontal sectional view taken on the line *x x* of Fig. 1. Fig. 3 is a vertical sectional view taken on the line *y y* of Fig. 2. Fig. 4 is an end view of the furnace, with a portion of the masonry broken away to show the arrangement of the generators. Fig. 5 is a view in perspective of one of the vertical grate-bars. Fig. 6 is a view in perspective of a detachable rack for use in raising the damper of the furnace. Fig. 7 is a view in perspective of the lever used in raising the damper. Fig. 8 is a view in perspective of one of the bents or frames to which the

side walls of the generators are secured. Fig. 9 is a detached view of the rear damper.

A indicates the furnace, which is set in a suitable housing of brick or masonry, and is by preference of the form shown in the patents granted to me November 19, 1890, Nos. 415,626 and 415,627, in which the fuel is fed to the point of combustion by gravity, said fuel being supported, together with the incandescent fuel which is being burned, on a bed of ashes, the fuel being fed down by gravity, as before stated, to the point where it is consumed, by removing a portion of the ashes from the lower part of the furnace, or through the trench B, which opens out through the door C in the side of the masonry, the ashes being pushed back into the trench by a suitable tool inserted in the opening D, the air for supporting and effecting a complete combustion being admitted through the opening E, which may be provided with a suitable damper or door for regulating the amount of air admitted.

It will be noticed that the opening E is narrower at the front than at the rear in order that the air may be heated as it comes into the opening and be distributed to the fuel in the furnace. It also prevents the heat from coming out into the room.

The rear side of the furnace A is provided with a sliding door or damper F, which is provided with a bail G, which projects upward through suitable openings on each side of the furnace, the handle or top portion being designed to rest on the top of the furnace, as indicated at *a* in Fig. 1.

To raise the damper F, I employ a bifurcated lever K to engage the bail G, the fulcrum of which is the cross-bar L, so that when the damper F is raised to the desired height the bail G is placed in one of the notches of the standard H and allowed to rest therein.

M is the main boiler or tank, into which the water is admitted through the pipe N from any suitable source of supply. The main boiler or tank M is provided with the usual steam-dome and safety-valve, and connects with the steam-chest of the engine by means of suitable pipes. The main boiler or tank M communicates with the horizontal

water-chamber O by means of pipes P and Q, one of each on each side of the tank or main boiler. The tops of the pipes P extend just through the bottom of the boiler or tank M, and are provided with nuts *b* above and below the bottom of the boiler, so as to hold the same in a rigid position. The object of these pipes P being flush with or extending a short distance above the bottom of the boiler is to supply the chamber O and the generators R with water from the boiler or tank M.

It will be noticed that the pipes or tubes Q extend some distance above the bottom of the tank M, as shown at *c* in Fig. 1, and the object of this is to allow the air to escape from the chamber O into the upper portion of the tank or boiler M.

The generators R, which may be of any desired number or size, do not connect at their lower portions with the chamber O, as they are in Patents Nos. 442,966 and 442,967, but are supported a short distance above the top of the chambers O by tubes which supply them with water, which will be more fully hereinafter described.

The generators R are composed of two sheets of boiler or other suitable iron, and are riveted at their edges to the frame or bent T, so as to form a solid structure. As before stated, the generators R connect with the chambers O by means of pipes or tubes V at their lower edges, and through which the proper supply of water is furnished the generators R. It will be understood that each generator connects with the chamber O in the manner heretofore stated.

The upper portion of each generator R is connected to the main boiler or tank M by means of the pipes or tubes W, said tubes being projected some distance up into the tank M, as shown at *d* in Fig. 3, whereby the steam from the generators R is carried up into the steam-space of the boiler or tank M.

It will be noticed that the water-space in the generators R is made thin and the sides are bolted together with a number of stay-bolts, and that the water is fed into the same at the bottom thereof, so that there is no liability to foam and all danger of explosion is obviated.

The rear ends of the generators R are provided with an enlarged portion A', which extends down below the main body of the same, and communicating with this enlarged portion are pipes B', provided with cocks or faucets C', through which the mud or other sediment is drawn from the generators. The different spaces between the generators connect with the stack D' by means of flues E', said flues being opened or closed by means of the damper F', said damper being operated by the lever G', and adjusted to any desired point by means of the rack-bar H'. The object of having a number of flues connecting with the stack is to more equally distribute the heat. The unions between the generators R and the

tank M are so arranged as to be easily detached, so that they can be detached at both ends and the same removed when occasion requires; also, the tubes by turning the tubes downward into the chamber O, it detaches them from the elbow, and the upper nuts or bosses are unsevered, which detaches the tubes from the generators and each generator can be taken out for repair.

I' are fenders or break-waters located around the four sides of the tank or boiler M, which turn the heat to the center of the tank M, and prevent the hot water from being blown out too rapidly from the generators. The chamber O is also provided with a blow-off pipe, through which the mud and sediment is removed from said chamber.

K' is a door located at the back part of the device, which is removable, so that the soot and ashes may be removed from between the generators.

A suitable air-cock C¹ is placed in the upper portion of the chambers M, whereby egress of air may be allowed when water is first pumped into the boiler.

What I claim is—

1. In a device for generating steam, an upper boiler or tank in which the steam and water are used for heating and engine purposes, said boiler or tank connecting with a lower steam-generating chamber O and with a series of said steam-generating chambers by upper and lower pipes, in the manner and for the purpose set forth.

2. In a steam-generating and heating device, an upper chamber or boiler in which the water and steam are stored, said chamber or boiler communicating with a lower water-chamber by means of pipes or tubes, the tops of which are slightly above the bottom of the boiler, and other tubes which also connect the lower water-chamber with the boiler, the last-mentioned tubes being projected up into the boiler above the ends of the first-mentioned pipes or tubes, whereby the lower chamber is freed from air upon the introduction of water into the said chamber, as set forth.

3. In a steam-generating and heating device, an upper chamber or boiler connecting directly with a lower water-chamber, and a series of steam-generating chambers connecting with the lower water-chamber and with the boiler by means of pipes at the bottom and top of such generators, whereby the water is admitted to the lower part of said generators from the chamber O and the steam through the upper pipes to the boiler or chamber M, as set forth.

4. In a device for generating steam, a series of vertical generators located in the path of the products of combustion and separating the same into chambers or flues, each of said generators being provided with a depressed portion at its rear end, which connects with blow-off pipes to relieve the same of mud and sediment, as set forth.

5. In a device for generating steam, a series

of generators located in the path of the products of combustion, a series of converging flues communicating with the spaces between the generators and with the stack, and a controlling-damper, all arranged as set forth.

5 6. In a device for generating steam, an upper chamber for water and steam, which communicates with steam-generating chambers by means of pipes, and a fender or baffle-
10 plate I', arranged above the entrance of the

tubes in the upper chamber, said tubes being arranged so as to project vertically above the bottom of the upper shell, as set forth.

In testimony whereof I affix my signature in presence of two subscribing witnesses.

EDWARD FALES.

Witnesses:

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H. M. STERLING.